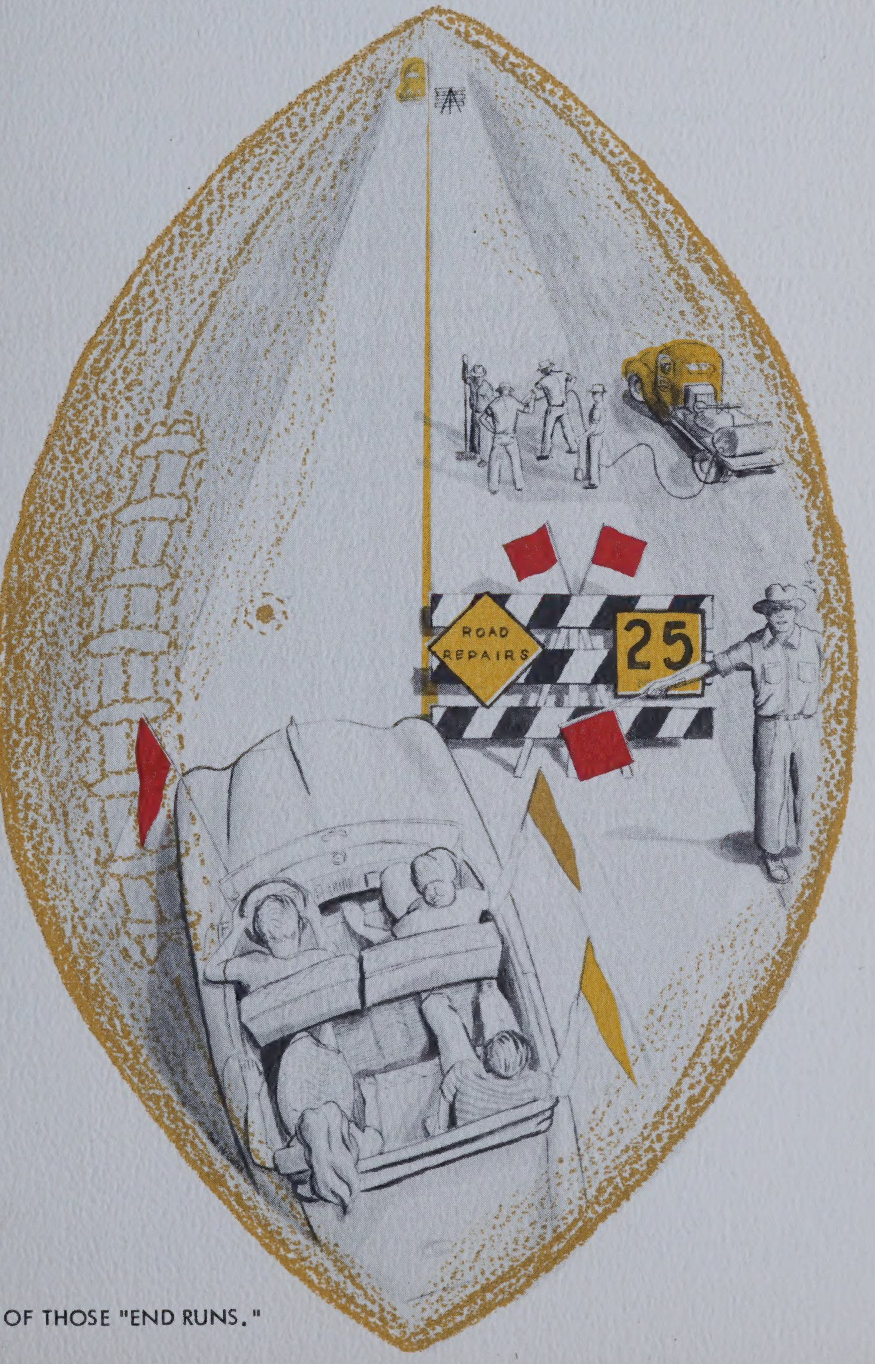
TEXAS HIGHWAY DEPARTMENT

Construction & Maintenance

BULLETIN No. 17
NOV, 1952



BEWARE OF THOSE "END RUNS."

Foreword

This bulletin is published for the purpose of presenting practical information applicable to current highway problems. These conclusions and data are not necessarily endorsed by the Highway Department nor are they to be construed as instructions. Employees are invited and urged to submit suggestions and relate experiences which would benefit those engaged in the construction and maintenance of highways.

Photographic services are available and other assistance may be obtained if desired in preparing material for submission. All material and comments should be directed to the Chief Engineer, Construction & Maintenance, Austin, Texas.

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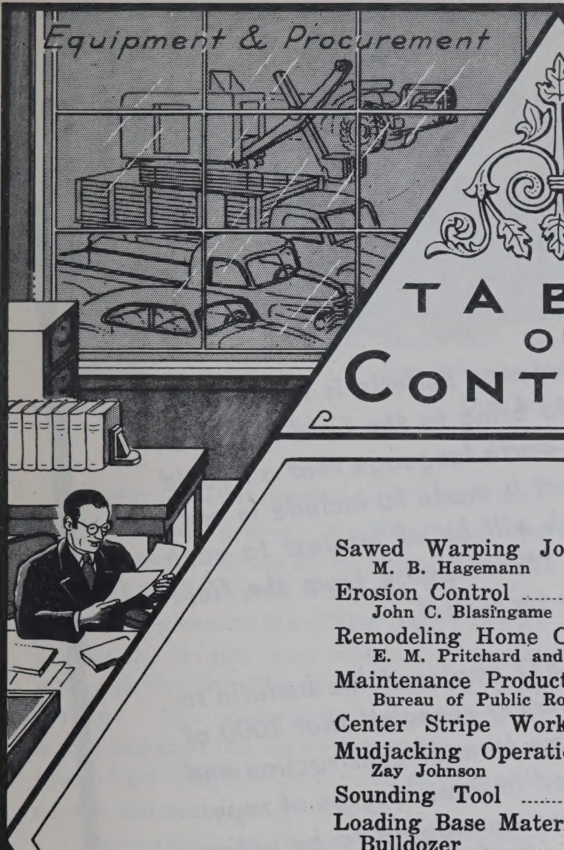
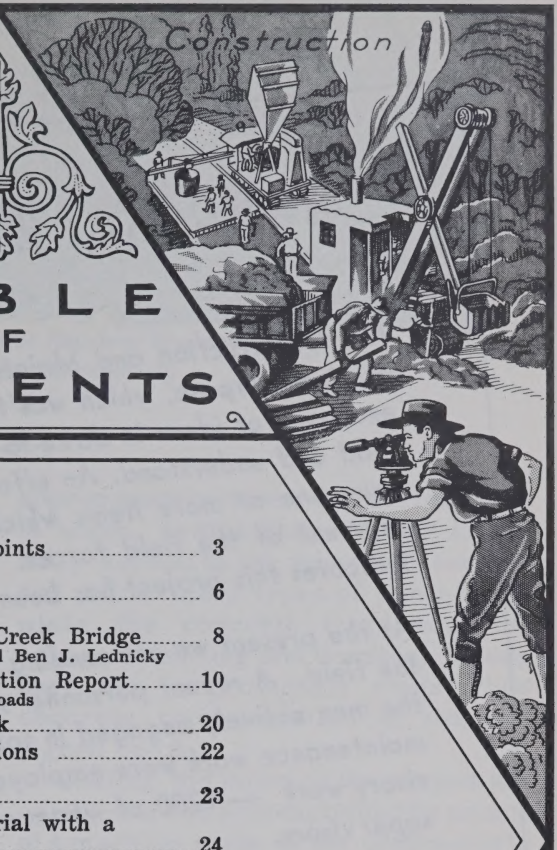
TEXAS HIGHWAY DEPARTMENT
AUSTIN 14, TEXAS





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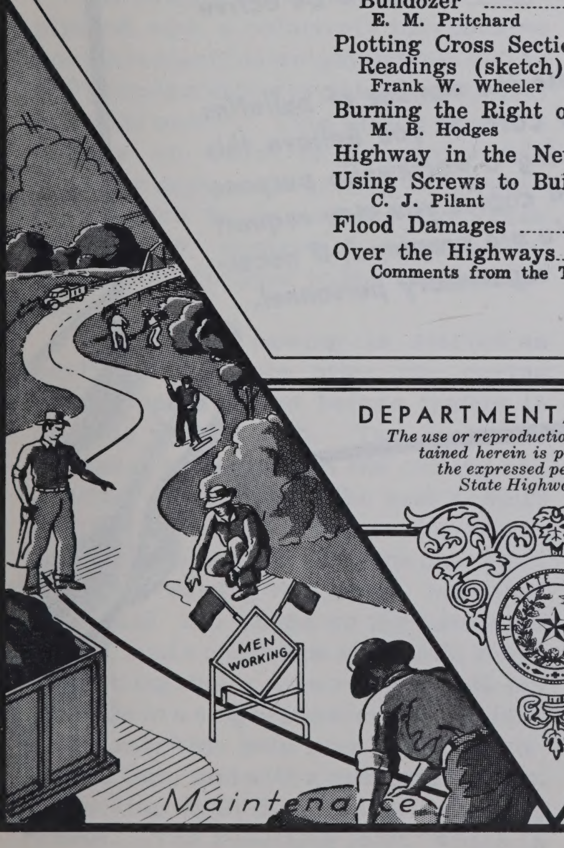
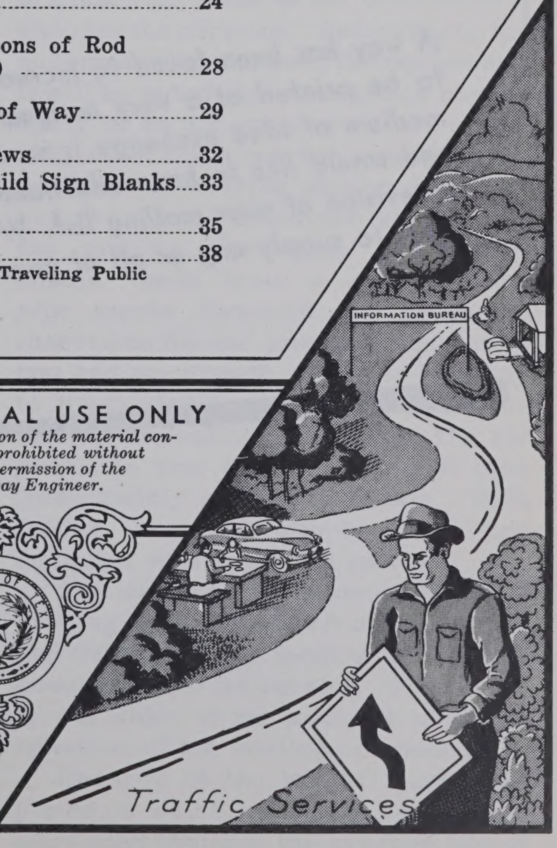




As We See It

The Construction and Maintenance Bulletin is fulfilling its original purpose, which was to bring to the field forces an exchange of ideas in down-to-earth language that all could read and understand. An effort is made to include in each issue one or more items which will be of interest to each segment of the field forces. The response from the field indicates this project has been successful.

At the present we are sending 872 copies of the bulletin to the field. A recent personnel survey revealed that 2000 of the men actively engaged in some form of construction and maintenance work were employed in some degree of supervisory work — 1200 of whom are considered to be active supervisors.

A way has been found to increase the number of bulletins to be printed at a very nominal cost. If you believe this medium of idea exchange is serving a worthwhile purpose and would like to have additional copies you may request a revision of your mailing list. We are prepared, if necessary, to supply any or all of your supervisory personnel.

Sawed Warping Joints for Concrete Pavement

M.B. Hagemann, Senior Resident Engineer
San Antonio Urban Expressway
District 15

After considerable difficulty was experienced in obtaining the most desirable results using asphalt board strip warping joints for concrete pavements of the expressway projects, a job was set up recently with a provision for sawing the warping joints. The resulting improvement was such that the sawed joint has been specified for the concrete pavements of all subsequent projects.

The sawing of the joints is accomplished with a relatively inexpensive portable machine weighing from 400 to 500 pounds and powered by a heavy-duty gasoline motor. This motor drives a spindle on which is mounted a thin circular segmented cutting wheel one-eighth inch thick made of high grade steel with numerous commercial diamonds imbedded in the circumference.

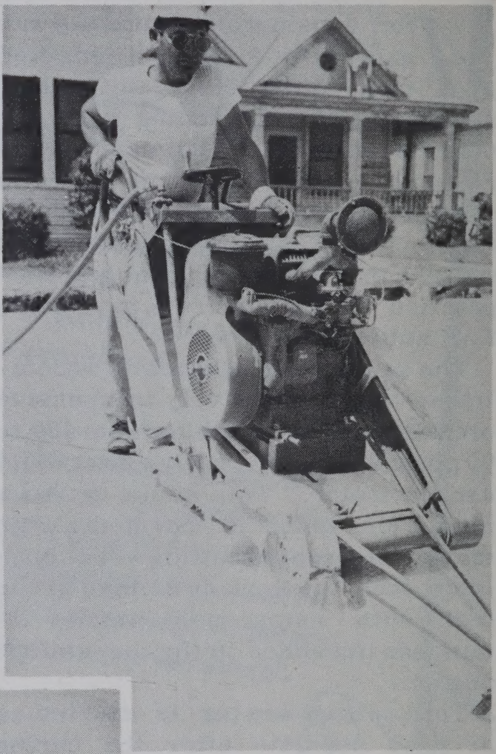
The actual sawing is started as early as possible after the curing period has elapsed before traffic is allowed on the slab. Two men are necessary to perform the cutting operation efficiently. The best results are secured with each serving alternately as helper and machine operator. Prior to sawing the joints, locations are laid out ahead on the pavement edges, and a chalk line is used to mark the cutting line. A two-inch depth cut is made in a single pass with the guides of the machine held true to the established line, and with a constant stream of cooling water directed on the cutting wheel. The resulting joint, which is approximately three-sixteenths inch in width, is straight. The cut is exactly normal to the pavement surface, and unlike other types of joints made while the concrete is plastic, the edges are strong and durable, having been cut in previously undisturbed concrete representative of the designed batch.

Sealing the joints on the project just completed was accomplished by means of a machine made in the contractor's shop for the purpose. Referring to the accompanying photos of the equipment, it will be noted that it consists essentially of an air pressure drum on the left, a fuel container for supplying the pear burner heating unit on the right, and the center container which holds the sealing compound. A fishtail nozzle made from a one-half-inch pipe nipple flattened and ground to insert into the cut joint approximately one and one-fourth inches is attached to the feeder pipe from the tank containing the sealing compound. The air pressure line enters the feeder pipe immediately above the nozzle. Both feeder and air supply lines are equipped with adjusting valves.

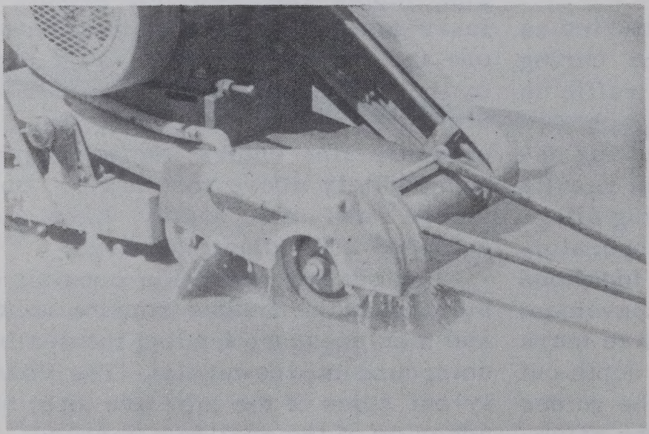
The sealing operation consists of blowing out the residue from the sawing and then pressure feeding the sealing compound into the cut slot. The cleanly-cut sides of the joint are ideal for adhesion of the sealing compound.

Records of the project just completed on which limestone aggregates were used indicate the average life of the cutting wheel to be about 4, 200 feet with a cutting rate of about 50 feet per hour. The machine used on this project cost about $750, and the twelve-inch diameter wheels were $160 each. The actual cost of cutting the joints on this job, as nearly as could be determined, amounted to approximately 13 cents per foot. Since it was convenient on this project, the contractor arranged to tap yard hydrants for cooling water throughout the job. A slightly higher unit cost on the sawing would have resulted if it had been necessary to haul the water.

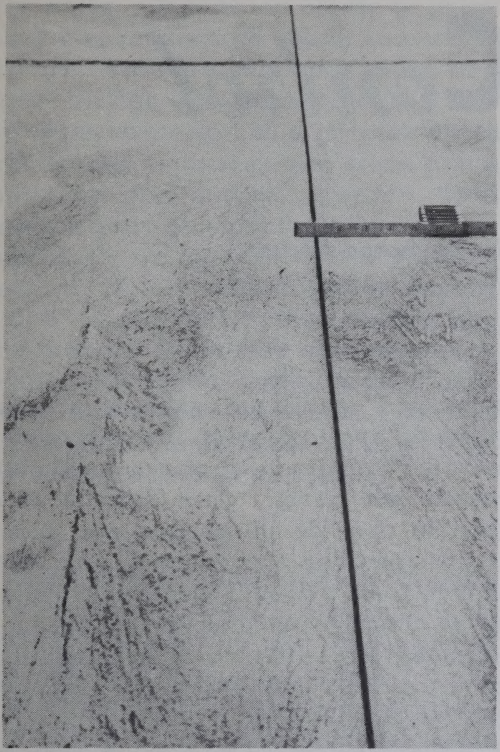
An actual cost comparison between the sawed joint and the asphalt-board joint is not easily ascertained, and it is possibly not too important, particularly in view of the resulting improvements in the finished product and the fact that no increase in unit bid prices for concrete pavement has occurred since the change in type of joint.



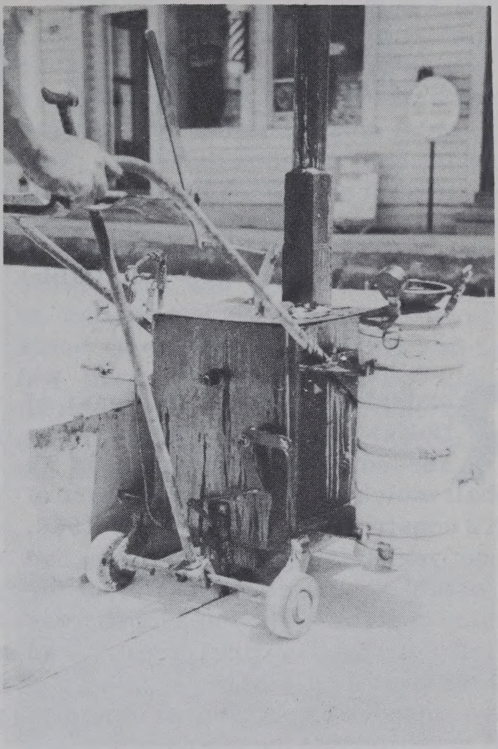
Concrete sawing machine.



Close-up of sawing operation.

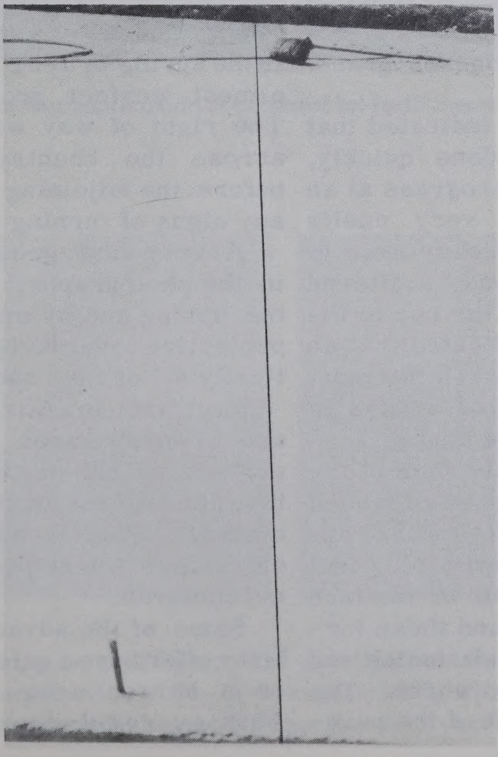


Close-up of sawed joint.



Joint sealing rig.

Completed joint.



Erosion Control

John C. Blasingame, Senior Landscape Adviser
District 18

Roadsides on U.S. 67 east of Dallas in Dallas County were seeded with Bermuda and an asphalt mulch was applied as a part of Unit 2 construction during July, 1948. Three years later the Bermuda had not established a cover sufficient for erosion control. The cut slopes, especially in the "critical area," had become practically bare.

An inspection in the summer of 1951 revealed that there was a sparse, scattered growth of Bermuda over the roadsides and in the center strip. This Bermuda was not healthy and vigorous. It appeared to be on the verge of dying due to starvation. There was also a scattered growth of Johnson grass, clovers, and vetch.

These observations indicated that if something wasn't done quickly, erosion was going to progress at an accelerated rate, and very costly measures would be necessary later to regain control. The weak, scattered growth was considered the key to the situation. It clearly indicated that an application of fertilizer was the most practical and economical means of establishing a protective cover.

Since large areas of the face of the cut slopes were bare, they were seeded in October, 1951, with Italian rye grass. Rows were plowed four feet on center along the contour on the face of some of the slopes and these furrows filled with Bermuda mulch sod and rolled with a truck wheel. The entire right of way outside of the pavement and stabilized shoulders was given an application of 16-20-0 commercial fertilizer at the rate of 500 pounds per acre. This formula was used to provide 80 pounds per acre of nitrogen for the grasses and 100 pounds per acre of superphosphate for promoting root growth of the grasses and the soil-building legumes (clovers and vetch) that were already present in the right of way.

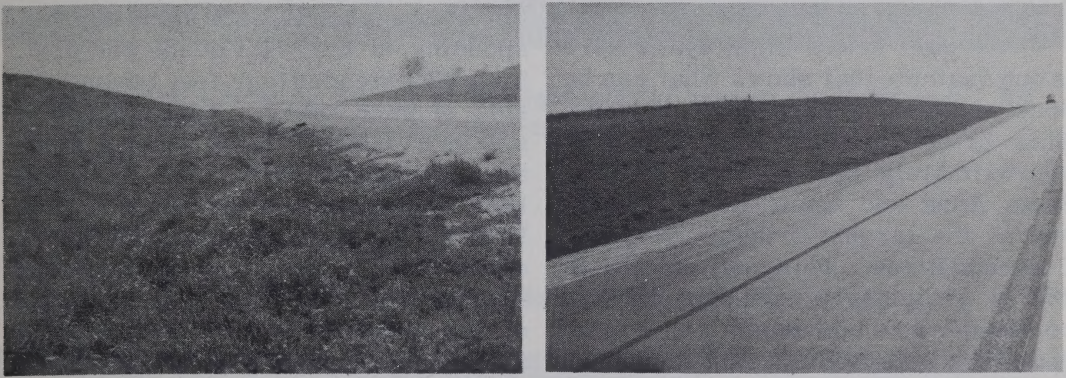
The fall of 1951 had enough rain to dissolve the fertilizer and put it in the ground where it was available for the plants. The following winter was very dry, so the fertilizer was not leached away. There were several good rains in the spring of 1952 which brought on almost perfect growing conditions. The right of way was a green strip across the country several weeks before the adjoining pastures showed any signs of turning green.

A very lush growth, as indicated in the photographs, was made during the spring and by midsummer a good protective cover had grown over practically all of the roadsides.

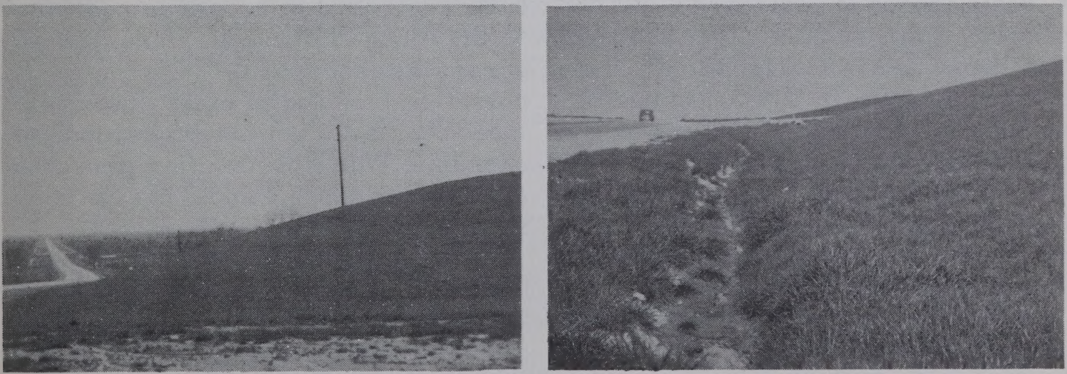
Fertilizer is a fairly cheap material and in many cases, as in the above project, it can mean the difference between success and failure in erosion control. This is especially true on cut slopes where poor soil is always encountered.

Some of the advantages that fertilizer offers are a quick growth to cover a barren area in a short time. This is very necessary on highly erodible soils. It enables plants to grow more vigorously both above and below ground. This not only adds more organic matter, or humus, to the soil but opens up the soil to a greater depth and allows it to trap and store more moisture for future crops. This greater storage capacity is beneficial, especially on the face of a dry slope, because it also cuts down the runoff, which is the factor that washes the soil away. Fertilizer also enables a crop to stay green longer, thus affording a longer growing period. This is important from the esthetic as well as the functional point of view.

The process of producing a dense crop of grass on poor soil immediately begins to build up the soil to a point where it will be able to support a cover crop for protection from erosion. Several seasons and several applications of fertilizer may be necessary to accomplish this result but it appears that this is still a very economical and effective method. It is considered an efficient operation since it can be done quickly and by a few men, therefore will not use up maintenance man-hours that can be used to better advantage in maintaining the pavement.



Growth obtained following application of commercial fertilizer on U.S. 67 in Dallas County.



Italian Rye grass growing on cut slopes. This grass has held these slopes of very poor soil for three years. An application of 16-20-0 commercial fertilizer was applied at the rate of 500 pounds per acre just before growth began the third year.

U.S. 283, Coleman County

Remodeling Home Creek Bridge

E.M. Pritchard, Assistant District Engineer
District 23
and
Ben J. Lednicky, Senior Landscape Adviser

We have all heard of the many "bridgenecks" that exist on our Texas highways. Here is one example that shows what can be done about such existing structures. This bridge is located on U.S. 283 approximately twelve miles south of Santa Anna and spans Home Creek, one of the largest tributaries of the Colorado River. This section of U.S. 283 is extensively used by trucking companies as a convenient route from South Texas to North Texas and other states.

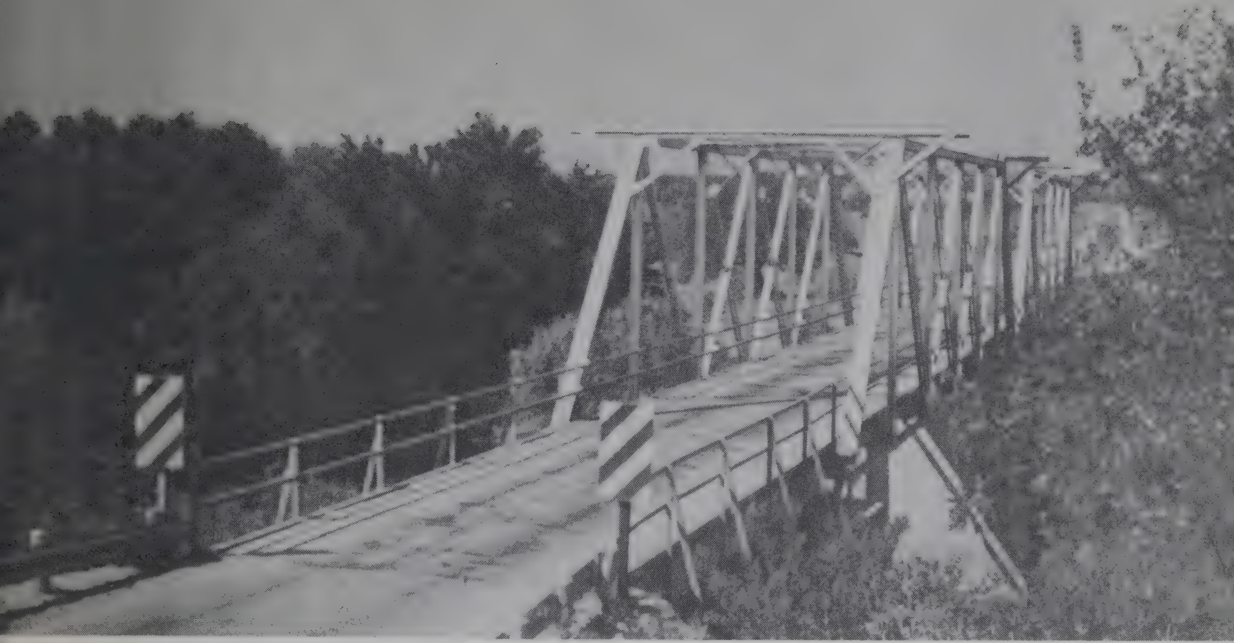
This bridge is a steel through truss bridge consisting of two 100-foot steel truss spans (six panels each 16 feet by 8 inches equal 100 feet) and one 40-foot T-beam approach, Standard 1-T. The roadway width is sixteen feet and vertical clearance is fourteen feet. This bridge was built in 1923. On two occasions the bridge was badly damaged by high loads striking the lattice bracing of the portals. To prevent the destruction of the bridge by these extremely high loads, the following corrective measures were taken.

Increasing the overhead clearance by three feet six inches to a total of seventeen feet six inches was performed in a rather unique manner. The lattice bracing from the portals was removed, except the knee bracing between the post and the top angle, and an 8 WF beam was welded across the top of the chords on a slant corresponding to the slant of the end post. This WF extended four feet beyond the side of each truss. Knee braces of six-inch I-beam were welded from the ends of the WF to the end post. Holes were cut into the flanges of the I-beams for existing rivet heads in the cover plate to have two flat surfaces for welding together. The top angle of the original portal bracing was allowed to remain and the new 8 WF 17 rested on top of it so that the two could be welded together. The welding was three inches spaced nine inches apart on both sides. The 8 WF 17 was then braced by two additional angles welded to the top chord to keep it in position.

Six-inch I-beams were placed across the chords at all interior panel points and welded in place, however, these beams did not extend beyond the chords. This construction presents a dramatic appearance but is very satisfactory.

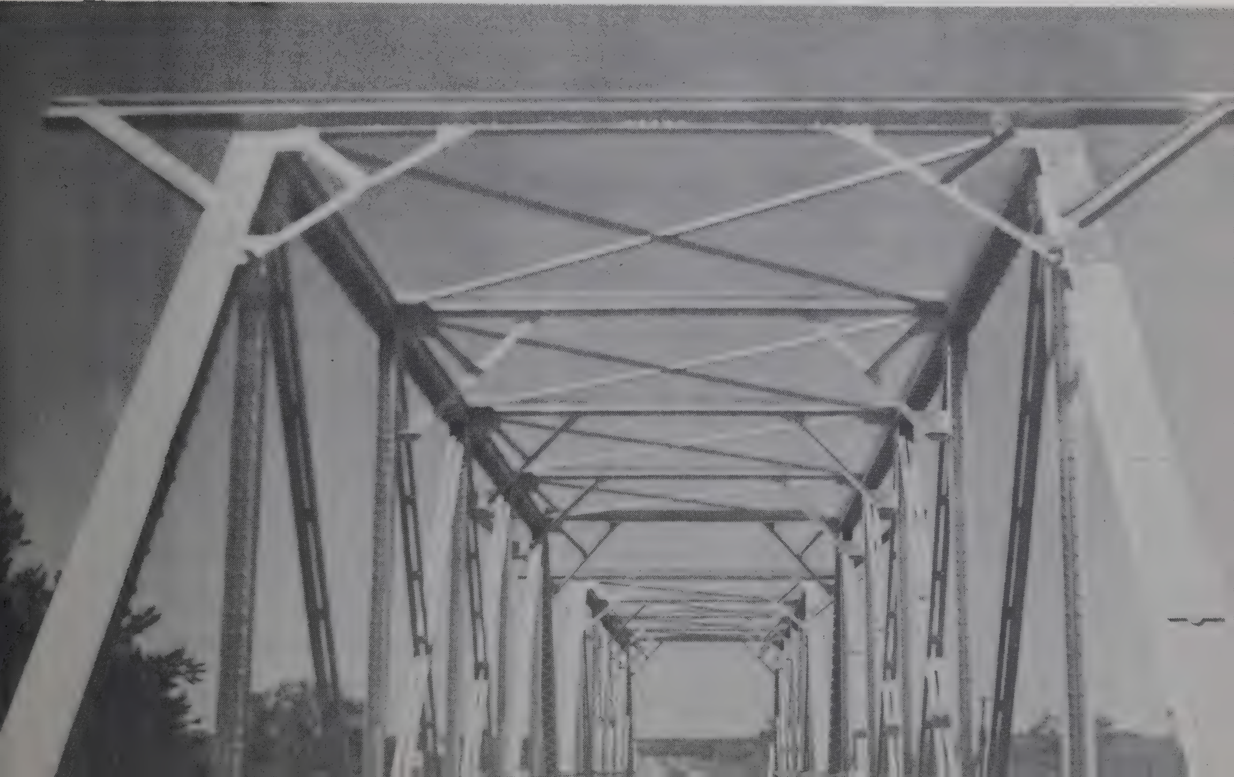
This modification was performed by the maintenance forces of District 23 under a Special Job, M-99-1-13 at a cost of $1,220.12, broken down as follows:

Labor - $658.21
Equipment rental - $156.76
Materials - $405.15



Looking south - Note the bracing of the eight-inch WF beam at the portal ends. The six-inch I-beams at the interior panel points do not extend beyond the chords.

Close-up of construction detail at the portals.



Report on Maintenance Production Study No. PS 2009

STATE OF TEXAS

By: *Merle L. Beach*
Gilbert W. Gray
Philip B. Keasey
Keith F. Kohler
Keith P. Lautenbach

HIGHWAY ENGINEERS, *Bureau of Public Roads*

This article is an extract from Report No PS 2009 of the Production Cost Unit, Research Division, Bureau of Public Roads. Only the introduction and two of the eight studies are included, but the remainder of the studies will appear in future issues.

The importance of job planning, organization, and equipment use in normal maintenance jobs, which is clearly shown in these comprehensive studies, should make this article especially interesting to maintenance employees.

Part 1. Introduction:

During the period from January 17 to 29, 1952, production studies of maintenance operations were conducted on work performed by the Texas Highway Department in Travis County. Studies of this kind are one element of a broad program in field research on the construction and maintenance of highways. They are made on the basis of needs evidenced, either directly or through research committees, by various contractors, state highway officials, and other interested parties.

The actual field studies are made by the Research Division of the Bureau of Public Roads, which has at its disposal facilities for conducting such work on a nation-wide basis. Individual studies are made possible through the cooperation of the contractor or agency involved. Copies of each report will be furnished each of the cooperating parties where applicable. The data presented and the comments made in this and other reports are strictly of a fact-finding nature.

The purpose of the studies presented here was to obtain data concerning time utilization and rates of accomplishment for labor crews and equipment under field conditions encountered at the particular time.

During the two-week period, studies were conducted on the following maintenance operations, which involved 270.2 man-hours of work:

1. One one-day study of bituminous patching on U.S. 81 approximately four miles south of Austin.
2. One one-day study of guide post setting and painting on State Route 29 in northwest Austin.
3. One one-day study of sodding embankment slopes and ditches on U.S. 290 near Manor.

4. One one-day study of filling "dry weather" cracks on State Route 29 about ten miles south of Austin.

5. One one-day study of center stripe marking on U.S. 290 and Farm Road 12, performed by a special striping crew.

6. One one-day study of straightening and painting guardrail on State Route 29 just south of Austin.

7. One one-day study of brush clearing and burning on State Route 93 near Oak Hill.

8. One one-day study of barbed wire fence erection on U.S. 290 near the eastern city limits of Austin.

The State of Texas is divided into 25 highway districts for administrative purposes. Each district has a District Engineer, under whom a District Maintenance Engineer or Superintendent handles the general supervision of maintenance operations. Each district is made up of from six to eighteen counties, each of which generally has one warehouse and one maintenance foreman. This setup varies somewhat in the western districts. The maintenance foreman is in charge of actual field operations and all work scheduling if done by him. The state does maintenance work on primary, secondary, and farm to market roads. The maintenance of unsurfaced roads is handled at the county level.

This study was conducted on crews working out of the state maintenance yard for Travis County in District 14. Travis County contains 146.1 miles of state-maintained roads, all of which are all-weather surfaced. Of this total mileage -- most of which is asphalt -- 14.0 miles are four-lane, 12.4 miles are three-lane, and 119.7 miles are two-lane highway. Traffic is comparatively heavy in this area, especially in or near the Austin suburbs, and gives rise to a variety of maintenance problems.

There are twenty men, including the maintenance foreman, working from the Travis County maintenance yard, at Austin. One of the men is a full-time bookkeeper and yardman. Another is employed as a night watchman and mechanic. The rest of the men perform a variety of jobs, but usually have some specialty which is their general assignment. Three of the men are particularly adept at bituminous patching and do most of that type work in the area. Five of the men are assigned as truck drivers and act as lead men on small crews. One driver and his helper handle the road signs and miscellaneous painting. Another is a specialist in guide post and guardrail work. One man is employed as a motor patrol operator and does all the blading. There is also a heavy truck operator. One driver goes out with the oiling unit whenever it is used.

The men are rated as skilled, semiskilled, or common laborers for payroll and administrative purposes. Ranges in hourly pay rates for maintenance men are as follows:

Skilled labor	$1.28 to $1.58
Semi-skilled labor	0.92 to 1.27
Common labor	0.75 to 0.91

All time, regular or overtime, is paid at the same hourly rate. The foreman and bookkeeper are salaried employees.

In the summer the crew is increased by four or five men. These men are added to handle additional mowing requirements during eight months of the year. An additional item of extra summer work is the watering and hand mowing of safety islands along divided highways.

Equipment assigned to the Travis County maintenance yard on a permanent basis is as follows:

1 - Pickup (assigned to the Maintenance Foreman)

5 - Dump trucks with four-yard beds (four 1950 and one 1951)

1 - Service and grease truck

1 - Maintenance roller, 3,300 pound (trailer type)

1 - Asphalt spray trailer unit with heater

1 - Motor patrol, 20,000-pound class, 53 horsepower

1 - Three-wheel roller, five-ton

4 - Farm tractors with mower attachments

1 - Truck with 2,000-gallon semi-trailer water tank unit

1 - Front-end loader with one-half cubic yard scoop

1 - Conveyor type force-feed loader, self-propelled

1 - Tractor and pneumatic roller

1 - Concrete mixer, ten-cubic foot

1 - Diesel storage tank, 400-gallon, trailer mounted

2 - Asphalt storage tanks, 11,000 gallon

In addition to this equipment, the district asphalt crew equipment including ten dump trucks, is stored at the warehouse and available for use as needed. Other items of district equipment are also parked at the warehouse.

The equipment is maintained by the night watchman, who is also a mechanic. He does such work as greasing the trucks, changing oil, making minor repairs, changing tires, and refueling. Major repairs are made at the District Shops. The night watchman also makes various preparations for the next day's work. Before a patching or sealing operation, he starts the heater in whatever type of asphalt unit is to be used so that the material is ready to pour or spray when the crew starts. If the operation is to require the use of sand or chips, he uses the loader to fill the trucks to be used. Preparations for the next day are also made by crews who finish their day's work and return to the yard early. If a large crew is to be involved, as on a crack-filling or sealing job, such preparatory work reduces the man-hours lost in waiting for servicing or loading trucks and other equipment.

The foreman checks the principal roads in the area twice a week and the others once a week to determine maintenance needs. Such inspections are generally carried out while he is engaged in supervising the various crews. On Saturday mornings, the maintenance force "runs the roads." All roads are then patrolled to clean up the roadsides and roadside parks, and to straighten signs, pick up and bury dead animals, and repair minor chuckholes.

Because of the heavy traffic and the relatively high percentage of extra-lane mileage in the Travis County warehouse area, maintenance costs per mile are somewhat higher than in adjoining areas. In December, 1951, for example, $47.02 per mile was authorized and expenditures were $58.58 per mile. During the same month, the average corresponding costs in other District 14 areas were $31.18 and $28.89, respectively.

The scheduled shift for the maintenance forces is from 7:30 a. m. until 5 p. m. with one-half hour off for lunch, Monday through Friday, and from 8 a. m. until 12 noon on Saturday. This constitutes a workweek of 49 hours. The trucks are generally loaded with tools and equipment, and the men have their instructions and are ready to leave the yard at 7:30 a. m. In the evening, travel from the work site to the yard is done on the mens' own time. All productive time before 7:30 a. m. and all productive and travel time after 5 p. m. has been included in the time distribution shown in subsequent tables. This procedure is followed only as a means of enabling comparisons between specific types of operations in other areas.

Although a considerable variety of maintenance activity was encountered during the study, working time of both labor and equipment has been classified into three general groups: (1) Operating cycle items on the assigned task, (2) related work items and (3) waits and delays.

Operating cycle items are considered to be more or less constantly recurring productive work elements which are directly associated with, and essential to, the performance of a particular task. Related work items are considered to be those items which may be essential to the performance of the day's work but are not cyclical or directly associated with the accomplishment of the assigned task. For example, travel and preparatory work are included in related work items. Likewise, within the third category, waits and delays, there are many items which are inherent in a particular operation and are without doubt unavoidable. Waits and delays are so catalogued simply because their effect is to reduce accomplishment on the assigned task.

Supervisory personnel of the Texas Highway Department cooperating in the conduct of these studies were: Mr. W. D. Dockery, District Engineer, Mr. J. A. Russell, District Maintenance Engineer, and Mr. R. L. Wallendorf, Senior Maintenance Foreman.

Part 2. Bituminous Hot Mix-Cold Laid Patching Operations on U.S. 81:

On January 17, a study was made of patching operations by a three-man crew from the Travis County yard on a three-lane bridge approach approximately four miles south of Austin on U.S. 81. This crew had done considerable patching in Travis County, and had developed a marked proficiency in that type of work.

The equipment used on this operation consisted of a four-cubic yard dump truck and a 3, 300-pound maintenance roller (trailer type), plus the usual hand tools.

Prior to leaving the yard in the morning, the crew filled a 50-gallon drum with RC-2 asphalt from the main storage tank, hand loaded the truck with asphaltic concrete from the warehouse stockpile, and hitched the roller to the truck. Normally, a power loader was utilized to load the asphaltic mix, but it was not available on this occasion.

After arriving at the work site the roller was unhitched, prepared for rolling, and parked. One lane of the three-lane highway was blocked off by barrier type maintenance signs. This lane was patched and rolled before moving the barriers and beginning work on the adjacent lane. The patching consisted of building up low spots that had developed on the bridge approaches, and did not include any chuckhole or "spot" patching.

The same work pattern was used on each of six areas patched. The foreman marked out the area to be patched, while two men held a chalk line stretched out on the pavement to delineate the low spots. The foreman cut back a five-gallon can of RC-2 with gasoline while one man swept the area with a hand-push broom, and the third man loosened and manipulated the asphaltic mix in the truck. The foreman then applied the asphalt tack coat with a house broom, while the two men spread the asphaltic mix with scoop shovels. After applying the tack coat, the foreman and one man spread the asphaltic mix, while the third man raked and dressed the patch. The foreman frequently inspected the patch for low spots and directed the placing of additional mix as needed. One man then rolled the patch, under the foreman's supervision, while the other cleaned up around the patch area. When a patch was to be extended into the adjoining traffic lane, a strip approximately a foot wide was left to be rolled with the patch extension; thus no joint lines were visible on the completed patch.

Figure 1.
Patching operation in progress.

Eight gallons of RC-2 and three and one-half cubic yards of asphaltic mix were used in six patches covering an area of 285 square yards.

The following tables show distribution of labor and equipment time during a one-day study of hot mix-cold laid asphaltic patching operation.

TABLE 1.

Distribution of 28.7 man-hours (1,723 man-minutes) of working time for the three-man crew on asphaltic patching operations

Item	Time (Man-minutes)		Per cent of total working day	
Operating cycle elements on assigned task				
Mark out patch limits	97		6	
Clean surface before patching	16		1	
Broom on asphalt tack coat	152		9	
Shovel cold mix on patch	437		25	
Rake and dress patch	156		9	
Roll patch	32		2	
Clean up patch site	6		-	
		896		52
Related items including travel and preparatory work				
Travel to work site from yard	96		5	
Travel from work site to yard	97		6	
Maneuvers in yard and field	42		2	
Put out and pick up signs	33		2	
Load cold mix by hand	97		6	
Load and unload men, tools, equipment, and other materials	114		7	
Loosen cold mix and thin tack material at site	145		8	
		624		36
Waits and delays				
Wait for asphalt barrel to fill	24		2	
Wait on other operations	41		2	
Maintenance of tools and equipment	14		1	
Instructions and inspection	60		4	
Excess lunch	3		-	
Idle	4		-	
Personal	46		3	
Resting	7		-	
Other	4		-	
		203		12
Total		1,723		100

TABLE 2.

Distribution of 9.6 hours (576 minutes) of working time for the truck used on asphaltic patching operations

Item	Time (Minutes)		Per cent of total working day	
Operating cycle items on assigned task				
Men shoveling mix out of truck	225		39	
Related items including travel and preparatory work				
Travel to work site from yard	32		6	
Travel from work site to yard	32		6	
Maneuvers	37		6	
Put out and pick up signs	5		1	
Load asphaltic mix	35		6	
Load and unload men, tools, equipment and other materials	45		8	
Hitch and unhitch roller	8		2	
Roll patch with truck	2		-	
		196		35
Waits and delays				
Stand-by loaded while men work	152		26	
Wait on other operations	3		-	
		155		26
Total		576		100

Travel for the Day	Miles	Average Speed (Miles per hour)
To work site from yard	11.3	21
From work site to yard	10.6	19
Minor moves on the job	1.0	-
Total	22.9	

TABLE 3.

Distribution of 9.6 hours (576 minutes) of working time for maintenance roller on bituminous patching operations

Item	Time (Minutes)		Per cent of total working day	
Operating cycle items on assigned task				
Roll patch	30		5	
Start, stop, and maneuver roller	9		2	
		39		7
Related items including travel and preparatory work				
Travel to work site from yard	32		6	
Travel from work site to yard	32		6	
Hitch, unhitch roller	15		2	
		79		14
Waits and delays				
Parked on job while men work	393		68	
Wait for other operations	6		1	
Parked in yard before and after work	59		10	
		458		79
Total		576		100

Part 3. Setting and Painting Guide Posts:

On January 17, studies were made of a three-man crew setting and placing guide posts on State Route 29 near the northwest city limits of Austin. The posts were to be placed in front of a shopping center to eliminate a traffic hazard caused by vehicles parking and turning on the shoulder of the highway rather than using concrete driveways and parking facilities provided for the shopping center.

The crew which placed and painted the guide posts consisted of a leadman and two laborers. Equipment consisted of a four-cubic-yard dump truck and hand digging tools.

The posts were creosote-treated, whole cedar logs, approximately six inches in diameter and five feet long. They were in the truck at the start of work in the morning, having been brought to the maintenance yard and left in the truck the day before. Excess posts were unloaded by the crew

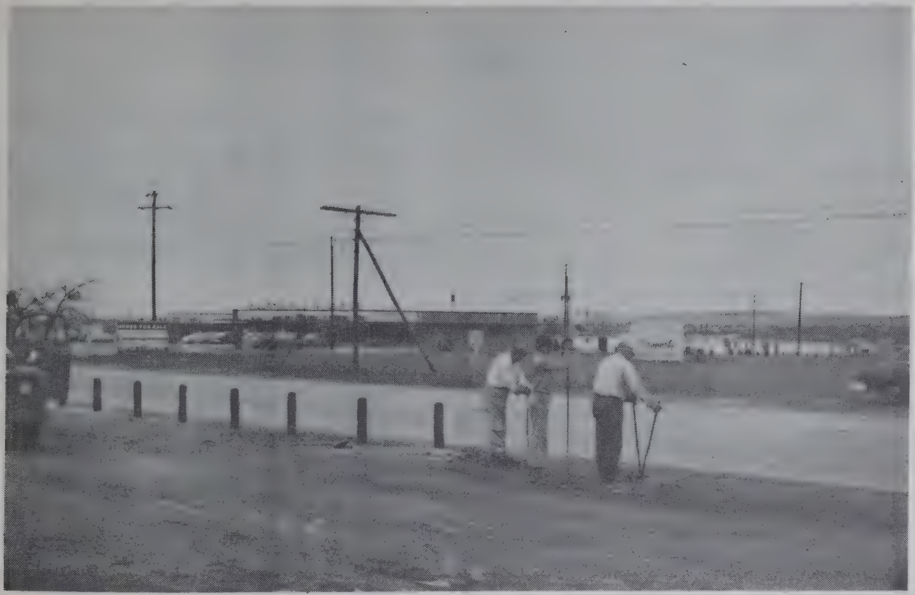


Figure 2.
Digging post holes for guide posts.

before leaving for the work site.

Upon arrival at the work site, the men parked the truck beside the tentative line of posts, unloaded tools, and began digging the holes with post-hole diggers and spade bars.

After all the posts had been placed, they were painted with one coat of fast-drying white traffic paint while the foreman loaded the tools and cleaned up the area. An additional coat of aluminum paint was to be applied later, followed by a black ring to be painted near the top of the post.

Alignment and position of the posts had been determined by the same crew the day before, and end posts had been placed. While the last few of a group of holes were being dug, one man unloaded the posts, measured the depth of the holes, and marked the posts for cutting. Post lengths were determined by measuring from a guide string to the bottom of the hole. Posts were cut and placed so that the tops were twenty-eight inches above the pavement surface. The posts were aligned by means of two guide strings, and then backfilled.

The setting and painting of guide posts was completed about 4:30 p. m., and the crew proceeded toward the maintenance yard, stopping along the way to sweep loose gravel from two intersections.

The three-man crew in 27.4 man-hours of total available working time, placed twenty guide posts on six and one-half foot centers, painted 34 guide posts, and swept 420 square feet at two intersections.

The following tables show distribution of labor and equipment time during a one-day study of setting and painting guide posts.

TABLE 4.

Distribution of 27.4 man-hours (1,647 man-minutes) of working time for a three-man crew setting and painting guide posts

Item	Time (Man-minutes)		Per cent of total working day	
Operating cycle elements on assigned task				
Put up and take down string line and line in holes	40		2	
Engineering, measuring, marking posts	41		3	
Dig with bar	83		5	
Dig with post-hole digger	240		15	
Saw off posts	85		5	
Hold posts while other man saws	52		3	
Set, backfill, and tamp posts	201		12	
Paint posts	115		7	
Walk between posts and truck and posts	18		1	
Clean up work site	39		3	
		914		56
Related items including travel and preparatory work				
Travel to work site from yard	53		3	
Travel from work site to yard	31		2	
Travel to new work site	27		2	
Minor moves	10		1	
Load and unload men, tools, equipment	32		2	
Unload posts	50		3	
Clean up intersections	64		4	
Paint preparation	7		-	
Miscellaneous work	7		-	
		281		17
Waits and delays				
Wait while other man digs	112		7	
Wait while other man saws	21		1	
Wait while others set posts	24		1	
Clean out truck	5		-	
Clean brushes	20		1	
Instructions, supervision	23		2	
Excess lunch	20		1	
Idle talking	25		2	
Idle other	44		3	
Personal	120		7	
Resting	32		2	
Other	6		-	
		452		27
Total		1,647		100

TABLE 5.

Distribution of 9.2 hours (549 minutes) of working time for dump truck on setting and painting guide posts

Item	Time (Minutes)		Per cent of total working day	
Operating cycle elements on assigned task				
Unit worked in the capacity of a general purpose service truck and had no clearly-defined operating cycle.				
Related items including travel and preparatory work				
Travel to work site from yard	18		3	
Travel from work site to yard	10		2	
Travel to new work site	9		2	
Minor moves, maneuvers	5		1	
Load and unload, men, tools, and equipment	17		3	
Unload posts	21		4	
		80		15
Waits and delays				
Parked while men work	461		84	
Clean up truck	5		1	
Instructions	2		-	
Traffic delay	1		-	
		469		85
Total		549		100

Travel for the Day	Miles	Average Speed (Miles per hour)
To work site from yard	8.4	29
Between work sites	2.6	17
From work site to yard	6.4	38
Total	17.4	

CUMULATIVE TOTAL OF CENTER STRIPE

AS OF AU

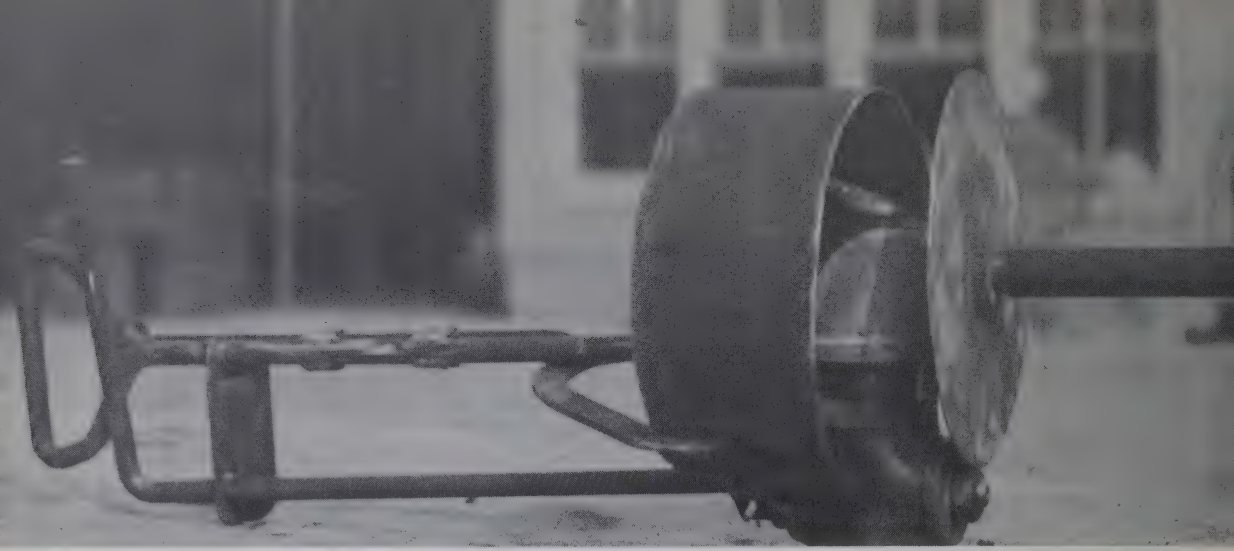
DISTRICT NUMBER	PAINT STRIPE	ASPHALT STRIPE	TOTAL COST	GALLONS OF PAINT USED PER MILE	PAINT STRIPE TOTAL MILEAGE
1	15,587.19	15,560.31	31,147.50	16.90	152.10
2	19,990.59	20,775.51	40,766.10	20.26	144.09
3	19,311.30	22,994.93	42,306.23	12.02	212.49
4	* 1,255.42	9,516.43	10,771.85	19.20	6.47
5	11,372.26	12,443.61	23,815.87	14.87	111.28
6	8,953.12	29,647.96	38,601.08	19.84	69.88
7	*20,689.91	38,050.20	58,740.11	17.66	125.57
8	16,423.20	24,757.47	41,180.67	17.90	127.50
9	16,816.52	22,355.65	39,172.17	18.08	138.74
10	26,506.35	13,233.69	39,740.04	17.95	324.33
11	7,008.12	9,886.36	16,894.48	18.17	70.43
12	8,253.67	6,996.05	15,249.72	15.22	93.99
13	6,469.15	4,521.10	10,990.25	16.91	43.71
14	21,482.97	6,277.72	27,760.69	17.40	200.30
15	27,387.35	16,820.23	44,207.58	17.05	268.44
16	4,917.98	5,691.00	10,608.98	11.15	62.44
17	12,352.01		12,352.01	18.00	119.00
18	38,373.44	28,709.22	67,082.66	14.65	477.18
19	15,995.92	15,716.86	31,712.78	16.64	174.49
20	14,164.60	16,782.96	30,947.56	20.93	120.15
21	6,347.46	22,807.92	29,155.38	18.20	40.33
22	10,432.24	15,370.96	25,803.20	17.28	89.28
23	20,094.50	6,155.50	26,250.00	17.00	242.30
24	17,827.93	13,866.31	31,694.24	16.40	158.30
25	6,122.15	4,584.42	10,706.57	14.30	54.74
	374,135.35	383,522.37	757,657.72		3,627.53

*District 4 - High cost per mile of paint due to low mileage in scattered sections.
No work performed in Districts 4, 7, 8, 16, and 25.
*District 7 includes 4,644 plastic markers installed by contract. ($5,047.99)

WORK PERFORMED BY DISTRICT

ST 31, 1952

ASPHALT STRIPE TOTAL MILEAGE	TOTAL MILEAGE	PAINT STRIPE AVERAGE COST PER MILE	ASPHALT STRIPE AVERAGE COST PER MILE
345.10	497.20	102.48	45.09
633.94	778.03	138.74	32.77
342.47	554.96	90.88	67.23
144.47	150.94	194.04	65.87
260.20	371.48	102.19	47.82
377.32	447.20	128.12	78.58
514.84	640.41	124.57	73.91
396.48	523.98	116.05	62.44
433.25	571.99	121.21	51.60
342.80	667.13	81.73	38.60
222.15	292.58	99.50	44.50
110.78	204.77	87.81	63.15
54.43	98.14	147.98	83.07
155.44	355.74	107.25	40.39
308.18	576.62	102.02	54.58
117.06	179.50	78.71	48.61
	119.00	103.61	
500.07	977.25	80.42	57.41
274.33	448.82	91.67	57.29
229.10	349.25	117.89	73.26
441.52	481.85	157.37	51.66
178.74	268.02	116.85	86.00
162.20	404.50	82.93	38.19
189.62	347.92	112.62	73.13
79.43	134.17	111.84	57.72
6,813.92	10,441.45	103.14	56.28



Mudjacking Operations

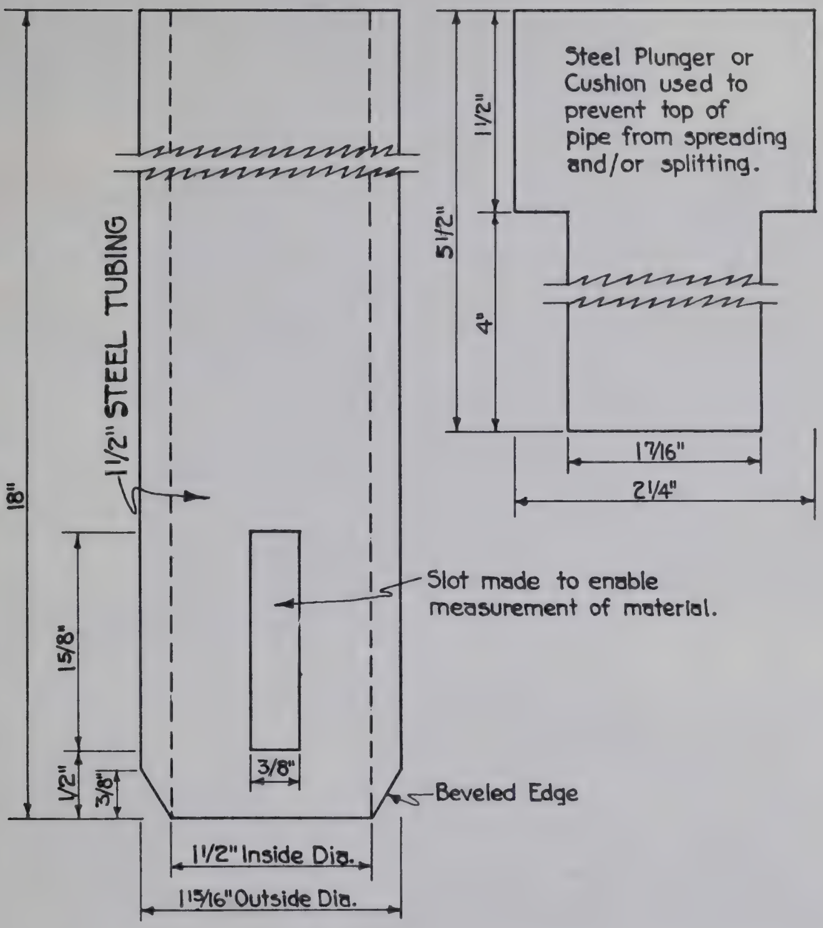
Zay Johnson, District Maintenance Engineer
District 13

A shield for mudjack nozzles has been developed to prevent slurry from squirting out under the pavement through a crack or imperfect seal around the nozzle. The shield was developed after a number of incidents when slurry squirted into and on passing automobiles, causing considerable damage and ill will.

The shield is suspended from the handle of the nozzle but can slide up and down as the end of the nozzle is withdrawn or inserted in the hole in the pavement.

THIS STEEL SHORTAGE IS JUST A LOT OF BALONEY!!?

DETAILS OF
SOUNDING TOOL FOR DETERMINING DEPTHS OF FLEXIBLE BASES


Steel Plunger or Cushion used to prevent top of pipe from spreading and/or splitting.
1 1/2"
5 1/2"
4"
1 7/16"
2 1/4"
1 1/2" STEEL TUBING
18"
Slot made to enable measurement of material.
1 5/8"
1/2"
3/8"
3/8"
Beveled Edge
1 1/2" Inside Dia.
1 15/16" Outside Dia.

Submitted by District 20

A sounding tool for determining depths of flexible base is shown in the sketch below submitted by W.E. Suter, Senior Resident Engineer at Jasper. Mr. Suter has had four of these tools made up and they have been used successfully.

The tool is made of one-and-one-half inch diameter steel tubing. Attention is called to a slot near the bottom. This slot begins one-half inch from the bottom. The one-half inch undisturbed material below the slot is a valuable aid in that it insures that the cutting edge will remain in good order. The slot is used as a "tell-tale."

After one or two soundings are made, it is easy to determine when the tool has cut through the base. When the tool is withdrawn, the demarcation between the base and subgrade is readily apparent. We then measure the distance from the bottom of the tool to demarcation. This value in turn is subtracted from the hole depth. The remainder, of course, is the depth of the flexible base.

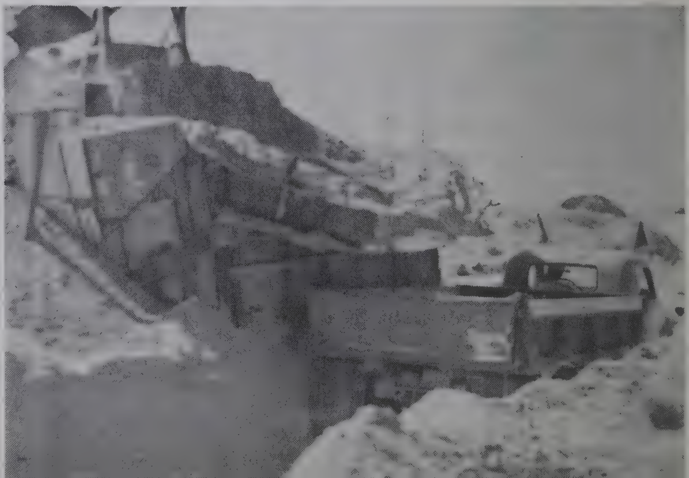
LOADING BASE MATERIAL WITH A BULLDOZER

E.M. Pritchard, Assistant District Engineer
District 23

With many shoulder jobs being performed by maintenance forces and the usual shortage of loading equipment, District 23 found it necessary to devise some economical method of loading base material. A.F. Cloud, Maintenance Superintendent, and Jimmie Seward, dozer operator, had an idea that a bulldozer could be used to good advantage. With the assistance of P.D. Pullig, Shop Mechanic, they experimented with several ideas and finally perfected the method shown in the photographs.

The material used for constructing this bulkhead framework can be found in any district salvage pile. One bulldozer can keep twenty trucks operating, and two bulldozers in one pit could carry on large-scale operations. The bulldozer draws a LeTourneau Model B Ripper behind to loosen the material whenever necessary. It is possible to change locations within the same pit in less than two hours. This includes the time from which the last truck is loaded at the old location until a truck is loaded at the new setup. The average cost of loading material with this setup is 7 cents per cubic yard.

In moving from one location to another in the same pit, preliminary passes were made with the bulldozer to determine suitable material.



10:25 A.M. – Last truck loaded prior to moving to another site 400 feet away.

10:40 A.M. - This undercutting with a maintainer is an essential part of the operation to allow the loose fill inside of the "thing" to fall out.

11 A.M. - Bulldozer clearing away loose material.

11:20 A.M. Framework being towed to another location. This also shows the ripper.

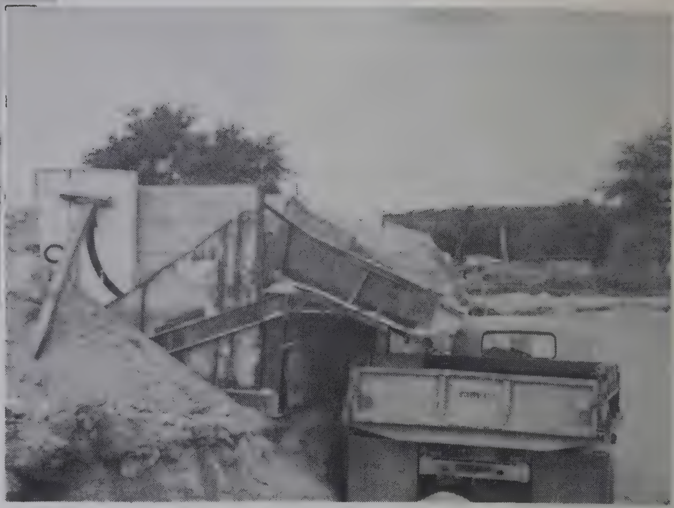
12 to 12:30 - lunch

1 P.M. - Framework is resting in place. It was necessary to complete digging the loading chute which is 100 feet long and four feet deep at the loading point. We had to build up under the framework to attain the desired loading height because solid rock was struck. This building-up is not recommended because loose dirt will give way under vibration of the tractor.

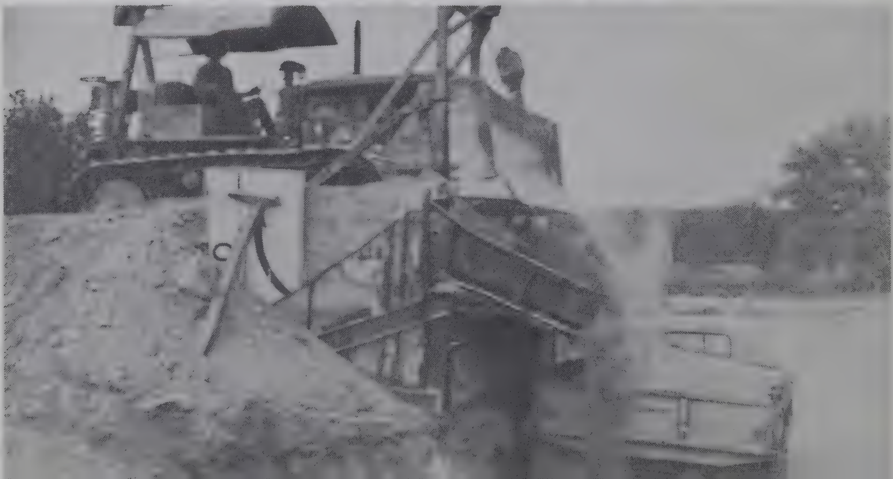
An empty truck backs into position while bulldozer backs up for another load.

Material being delivered into truck. The secret of the success of this method is to stop the bulldozer at a certain point.

The truck pulls up and backs into position.

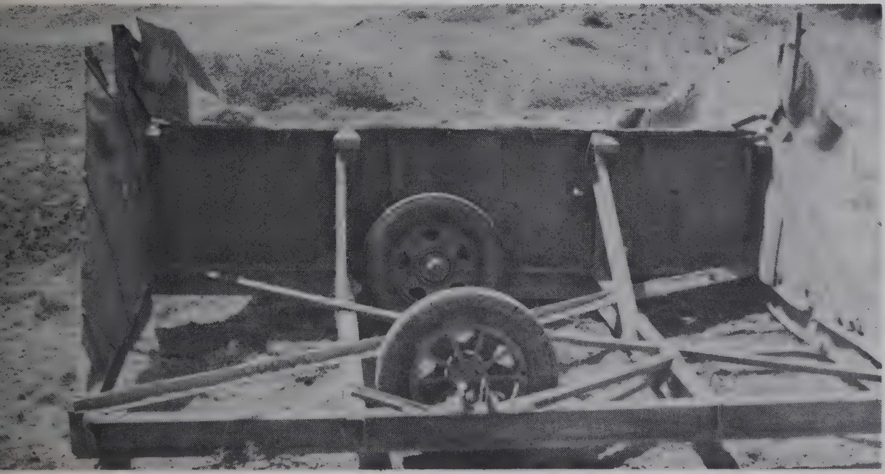


One pass with bulldozer loads a four-yard truck bed. Notice the small amount of waste spilling over the back end of the truck.

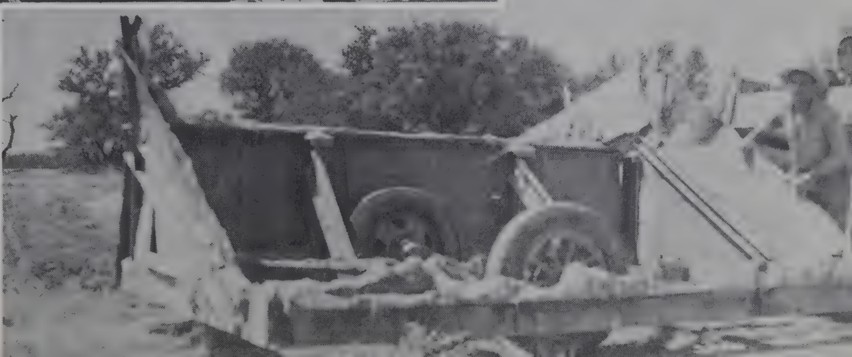


Front view of bulldozer pushing up a load of base material. The windrows serve as a channel, and they either absorb an excess of material on the blade or furnish material to give a full load every time.

General view of pit – The bulldozer can load material from any location in the pit.



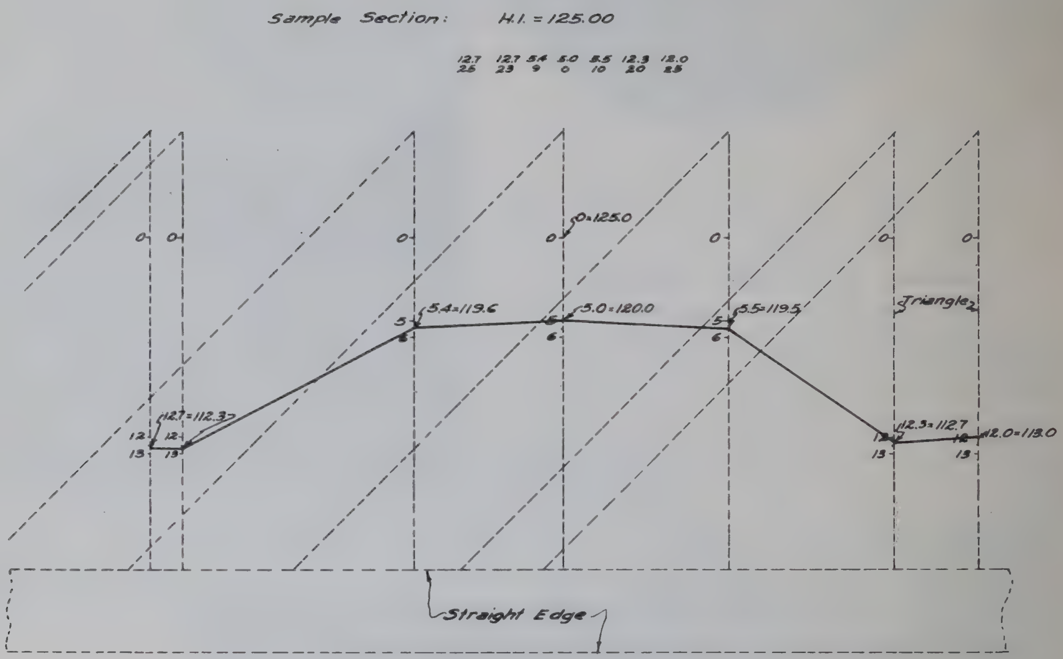
Close-up of the "thing."



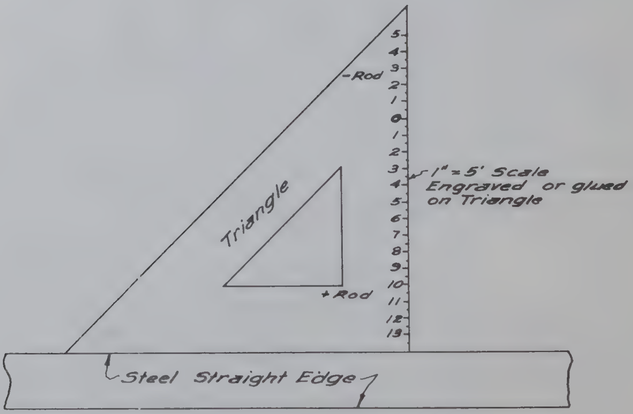
The contraption weighs 1,500 pounds and salvage material is used throughout. The wheels came from an abandoned maintainer.

SUGGESTED METHOD OF PLOTTING CROSS SECTIONS BY ROD READINGS

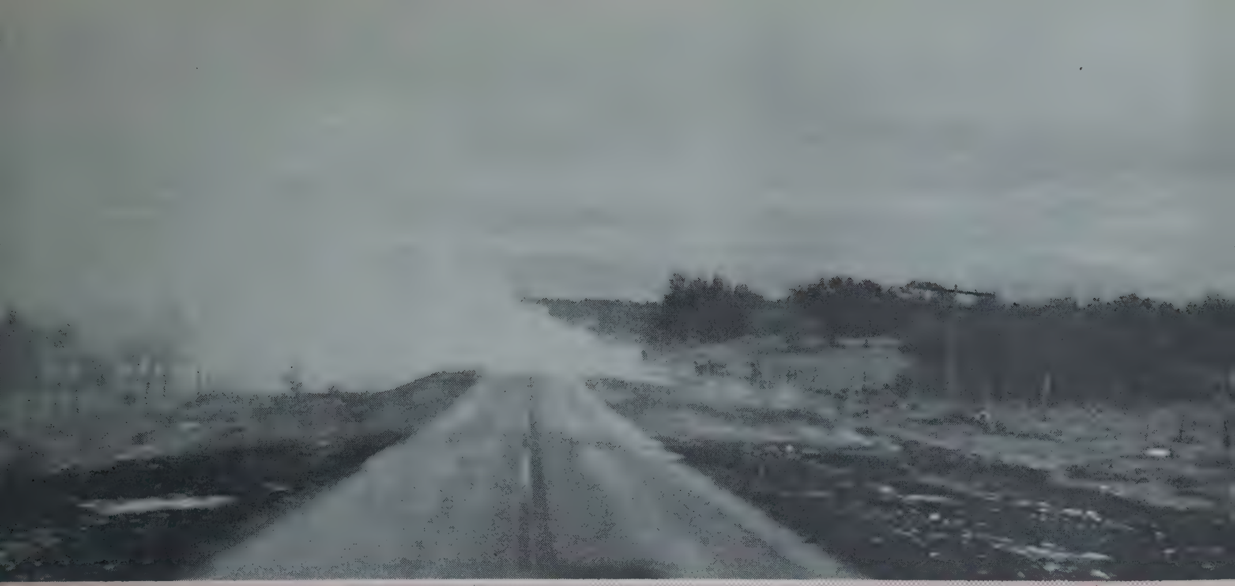
Submitted by:
Frank W. Wheeler, Senior Office Assistant
Jasper Residency, District 20



PLOTTING PROCEDURE



EQUIPMENT



Burning the Right of Way

M.B. Hodges, District Engineer
District 22

For many years there has been controversy regarding the construction of fireguards and the burning of right of way in an effort to prevent fires in adjoining pastures. I have always opposed the burning of right of way for obvious reasons, two of them being the hazard to traffic and the possibility of igniting the grass in the adjoining pastures.

During the present drouth we have had so many requests to burn the right of way adjacent to property that it became almost mandatory that we do so, especially in the hilly and rocky areas where it is virtually impossible to construct an ample fireguard. However, this is only done after a signed agreement with the adjoining property owner that he would place an equal number of men on the right of way to assist in the burning, and that he would not hold the Department responsible in case of any damage to his property. He also signs a statement at the end of each day's work that all fires ignited by our employees have been satisfactorily put out. A copy of each of the statements which we require the property owner to execute before and after the work has been inaugurated follows.

Maintenance Foremen were also instructed that in the performance of this work of burning grass it should be done on the lee side of the pavement to prevent a pall of smoke from being cast over the pavement, which would create an automatic traffic hazard. About two weeks ago I took the above picture on State Highway 41 in Real County. In this particular instance, the property owner had property on both sides of the right of way and, after burning on the north side (with wind out of the south), he prevailed on the maintenance crew to also burn on the south side. I came upon this fire from the east and drove through the pall of smoke for a distance of possibly one hundred yards. After reaching the end of it, I found myself directly astride the center stripe. It is absolutely impossible for one to determine the position of his car while driving through smoke, and for this reason, I object to burning rights of way. I believe that the picture illustrates better than mere words the hazard at this particular point, and you may rest assured that it will not occur again in this district.

________________________, Texas

_______________________, 195___

Mr. M.B. Hodges
District Engineer
Del Rio, Texas

Dear Sir:

This is to request that the State Highway Department assist in burning the right-of-way on (US) (State) Highway No. ________________________, ____________________________ County approximately _________________ miles _____________________ of _________________________ adjacent to ______________________________________ Ranch.

If the State Highway Department will assist in burning within the limits of the right-of-way we agree to accept the following terms and conditions:

I. That the work to be performed will be cooperative between the State Highway Department and men to be furnished by the undersigned, with each party furnishing the same number of men. These men will perform the actual work of burning and controlling the fire.

II. That we will furnish all necessary fuel or any additional material necessary in the burning.

III.That the State Highway Department is hereby relieved of any responsibility for any damage done or be liable for any damage in the event the fire should become uncontrollable and damage adjacent or surrounding property.

IV. It is agreed that at the end of each day (I) (We) will sign a statement to the effect that all fires which have been started have been satisfactorily extinguished and there will be no claim for damage against the State of Texas or the State Highway Department in connection with this work.

____
RANCH

BY:________________________________

____________________, Texas

____________________, 195____

MAINTENANCE FOREMAN

____________________, Texas
TOWN

Dear Sir:

All fires started in connection with burning of the right-of-way adjacent to (My) (Our) property on (U S) (State) Highway No. __________ on this date have been satisfactorily extinguished and (I) (We) do not hold the State Highway Department or the State of Texas in anywise responsible for any fire originating on (My) (Our) ranch by virtue of the burning of the right-of-way.

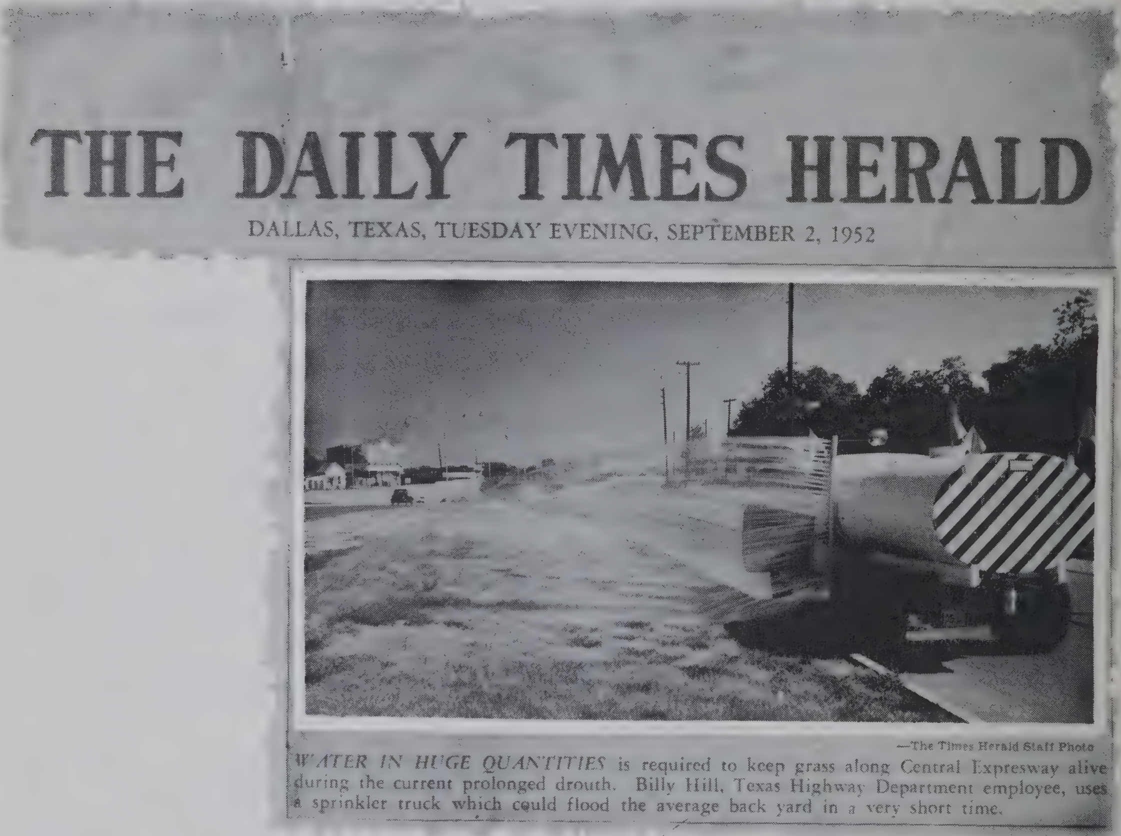
____
RANCH

BY: ______________________________

EDITOR'S NOTE:

C&M did some tall transplanting in the October issue by moving the famous dogwood tree on page 18 from Rusk, Texas to Rusk County. Readers will be glad to know that this well-known tree is now in its old location, approximately three miles south of Rusk, Texas.

Highway in the News . . .



THE DAILY TIMES HERALD

DALLAS, TEXAS, TUESDAY EVENING, SEPTEMBER 2, 1952

—The Times Herald Staff Photo

WATER IN HUGE QUANTITIES is required to keep grass along Central Expressway alive during the current prolonged drouth. Billy Hill, Texas Highway Department employee, uses a sprinkler truck which could flood the average back yard in a very short time.

This sprinkler attachment was designed and constructed in the District 18 shop for the purpose of sprinkling the sodded areas of the Central Expressway right of way. The pump is directly connected through a power take-off to the truck transmission and therefore the speed of the truck regulates the output of the pump and in turn determines the width of the spray. This proves to be very advantageous due to the highly variable widths of sodded areas on the Expressway.

Frank W. Cawthon, District Engineer
District 18

Using Screws to Build Sign Blanks

C.J. Pilant, Special Foreman
District 19

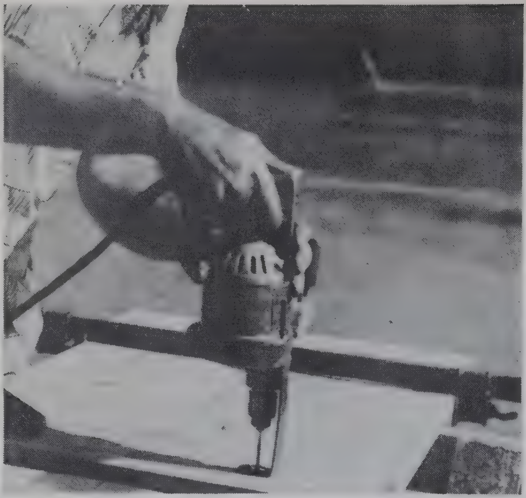
There was a time when all sign blanks in District 19 were constructed with nails, except the larger blanks, which were constructed of two thicknesses of one-inch lumber in order to carry reflector buttons. Wood screws were used on these larger signs.

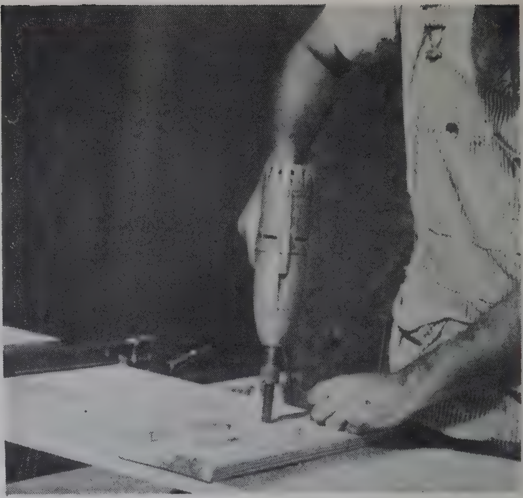
We soon noted that the signs constructed with screws were much more rigid, joints were tighter, and there was practically no cup in the lumber. In addition to this, we found that reconditioning sign blanks constructed with screws was much simpler than was the case with "nailed" blanks.

As a result of these observations, we began constructing all of our sign blanks with screws. We discovered that the blanks could be assembled in about one-third the time it takes with finishing nails, where the heads are set and holes filled. In reconditioning signs there is even a greater saving than in their original construction. When cracks appear from shrinking lumber, it is but a small job to remove screws, pull boards together with clamps, and reset screws. When only a portion of a sign is damaged, it is often possible to replace a single board and save the cost of a new blank. If the sign is damaged beyond repair, the screws can always be salvaged for re-use.

The only additional tools needed are a one-fourth-inch drill with stop for drilling pilot holes in cleats and a size 4U Ingersoll-Rand Impact Tool with screwdriver attachment. We use one and one-fourth inches Number 10 Wood Screws.

We feel that we are producing better signs; we know we can build them faster and for less money with screws.





Flood Damages

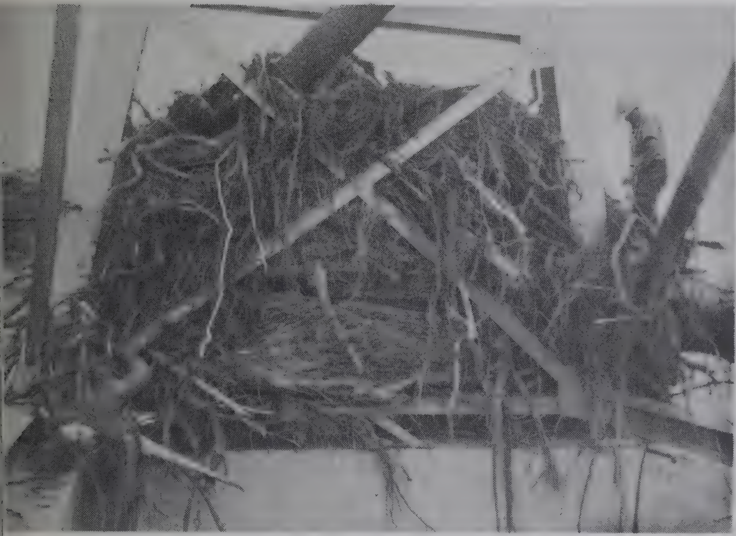
Damages suffered to highways and bridges in Districts 13, 14, 15, and 16 as a result of the recent flood amounted to around $667,500.

The Pedernales River Bridge on U.S. 281 in District 14 received the greatest damage. The superstructure and at least three piers were destroyed. Approximate cost of repairs is $350,000.

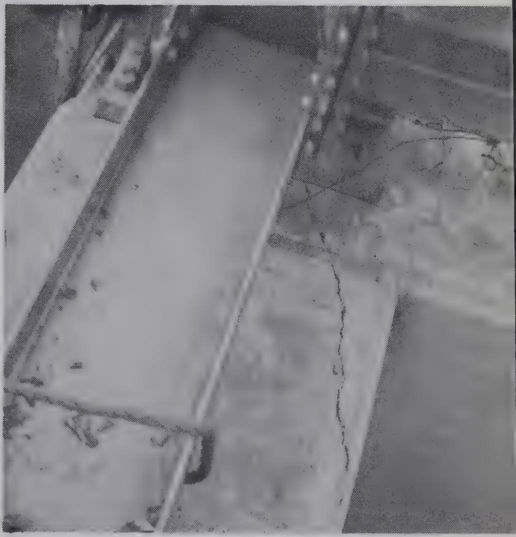
Estimated cost of repairs by districts is:

District 14	$500,000
District 15	67,000
Districts 13 & 16	100,000

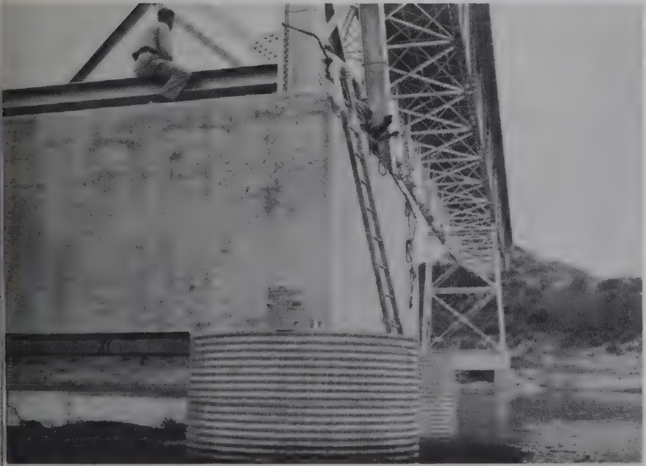
PEDERNALES RIVER
Ranch to Market 93



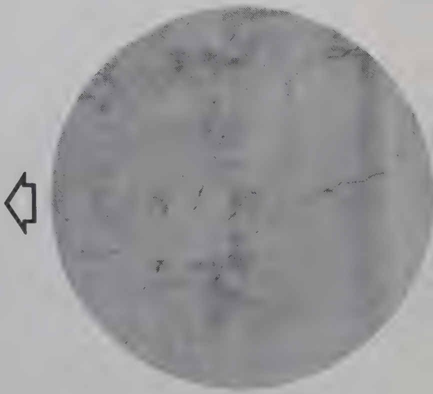
Drift lodged in steel tower bent.



Crack in concrete tie beams at base of tower bent.



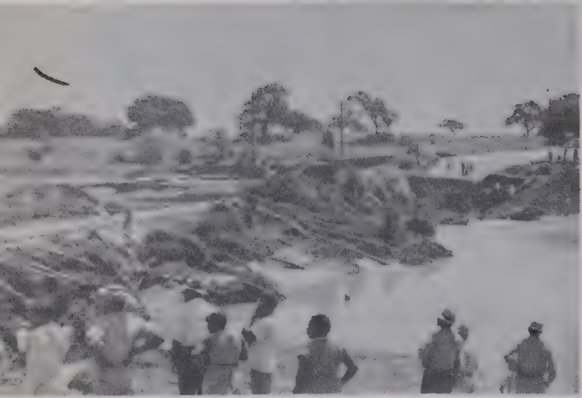
rack in concrete tie beams at base of tower bent.



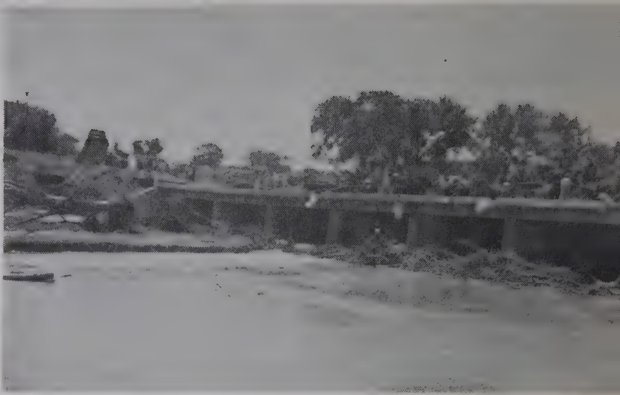
BLANCO RIVER

Blanco

U.S. 281



Looking downstream at drift which blocked waterway almost entirely.

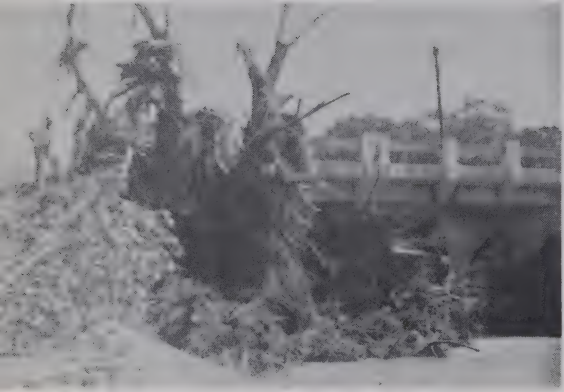


Washout at approach to bridge.

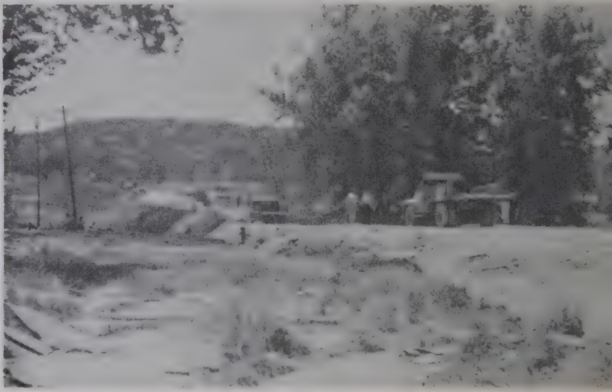
MILLER CREEK

About six miles south of Johnson City

U.S. 290 and U.S. 281

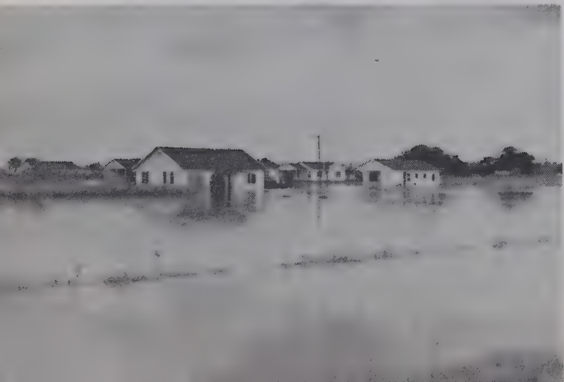


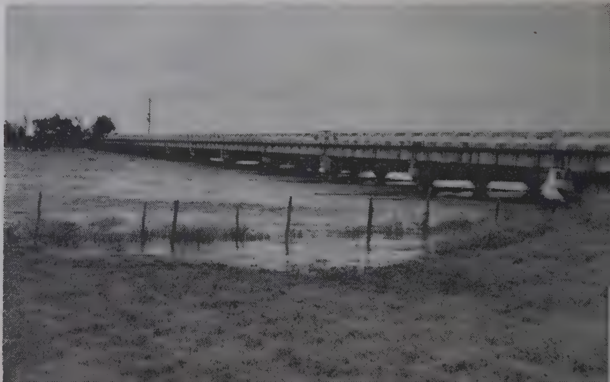
Looking downstream at drift almost blocking one span.



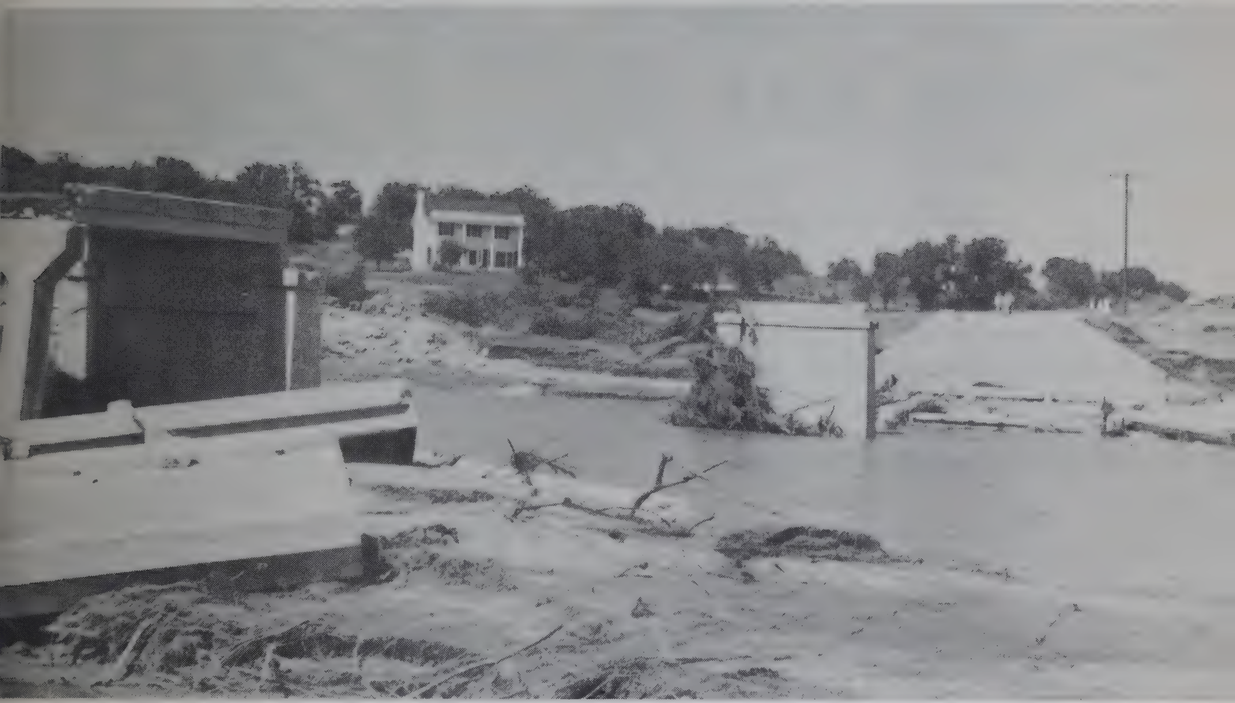
Repairs under way on washed out approach fill.

SAN MARCOS RIVER





PEDERNALES RIVER
About one mile north of Johnson City
U.S. 281



↑ Shows almost complete destruction of entire bridge.

↓ Looking downstream at a truss span and concrete girder span.

"Comments From the Traveling Public"
OVER THE HIGHWAYS

Honolulu, Hawaii

. . . I have been in many countries of the world, but have never seen any services to the motoring public as fine as the roadside parks which you provide along the highways. They are places of beauty which are much appreciated by travelers. I took advantage of them during my drive across your vast and interesting state.

An English traveler

. . . I'm writing in regard to damage done by your 2 men in truck # --- License # --- to my car on Highway # --- last Saturday at 4:05 P. M.

This truck was spreading gravel with bed raised as an empty truck going down the middle of the highway and did not move to their side, making an average of 45 or 50 miles per hour with no signal of what they were doing and as the loose gravel flying from their truck hit my car, it chipped the windshield and broke it across one corner. These men did not slow up and I turned around and went back to catch them and ask them why they were spreading gravel as they were with the bed raised as if it were empty and no signal and showed them the damage and they looked at us (me, my wife and mama) with a silly grin and said they were just working.

I've never known the Highway Department to spread gravel as this truck was and I've traveled the roads in --- Texas for the last 15 years.

I've been out of town all week and I would appreciate you letting me know what you intend to do about my windshield - my car is a 1951 Chevrolet - as to say nothing of the paint on the car. This was your men's fault and should it have been you, I'm sure you would feel as I feel about this matter and I do feel you should have a new windshield put in my car.

Trusting to hear from you by return mail, I am

(Signed)

. . . We didn't like your Ford auto stickers, "Built in Texas by Texans." My car was built in Detroit by Americans.

J. H. Currie
Detroit, Michigan

. . . People using roadside parks do not cooperate in putting trash where it belongs. I found cans and bottles littering roads and parks all over Texas . . .

Arthur J. Medwediff
Flint, Michigan

. . . The roadside parks all need drinking water and toilet facilities . . .

A Chamberlin
Spokane, Washington

. . . Your highways are too narrow with rough shoulders on the edge of highway . . .

William Cooper
Anaheim, California

. . . We didn't like the fast, reckless, dare-devil Texas drivers . . .

Kissimmee Park, Florida

. . . We would like to hope for water or spring or pump at all roadside parks . . .

Mrs. Ted Morioka
Eglin AFB Florida

. . . Route signs are too infrequent and some direction changes are not well marked -- also distances to next towns . . .

Berkeley, California

. . . Not enough road signs to tell you how many miles between towns . . .

Artesia, California

. . . We didn't like your narrow bridges! Or the center black line -- prefer white . . .

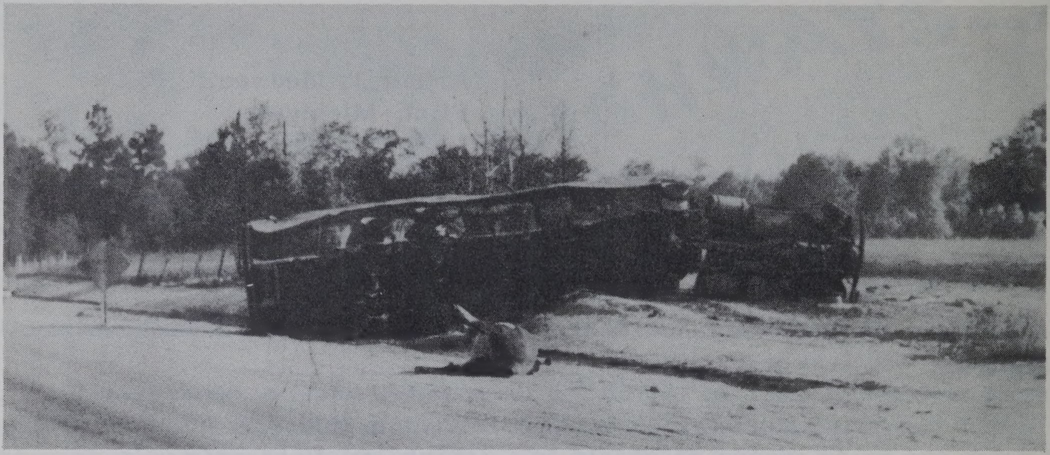
Mrs. J. D. Barhard
Arcadia, California

. . . A lot of your roads are too narrow . . .

George Warne
Detroit, Michigan

TEXAS, THE CATTLE STATE!

. . . Comments from tourists on our livestock situation . . .



DISLIKES (and how!)

. . . the - - - parade of cows, bulls, pigs, shoats, sows, mules, and donkeys on the roads . . . (see photo above)

. . .

E. L. Brown
Louisville, Kentucky

. . . the horses, colts, and pigs running loose on our highways . . .

J. Osty
Houston, Texas

. . . livestock on highways in East Texas . . .

Luverne, Minnesota

. . . livestock at large . . .

Akron, Ohio

. . . cattle on your highways . . .

Ogden, Utah

. . . livestock loose on highway . . .

Lake Charles, Louisiana

IN MEMORIAM

Thomas Steve Brown, Chief District Accountant, District 6, was instantly killed on the night of September 12, 1952, when his car collided with a bus. Mr. Brown was en route home from a Tax Collectors meeting in Odessa.

Garland W. White, District 11, was fatally injured on October 15, 1952, while operating a front end loader. Mr. White was thrown to the shoulder of the road and killed when the loader turned over on him.